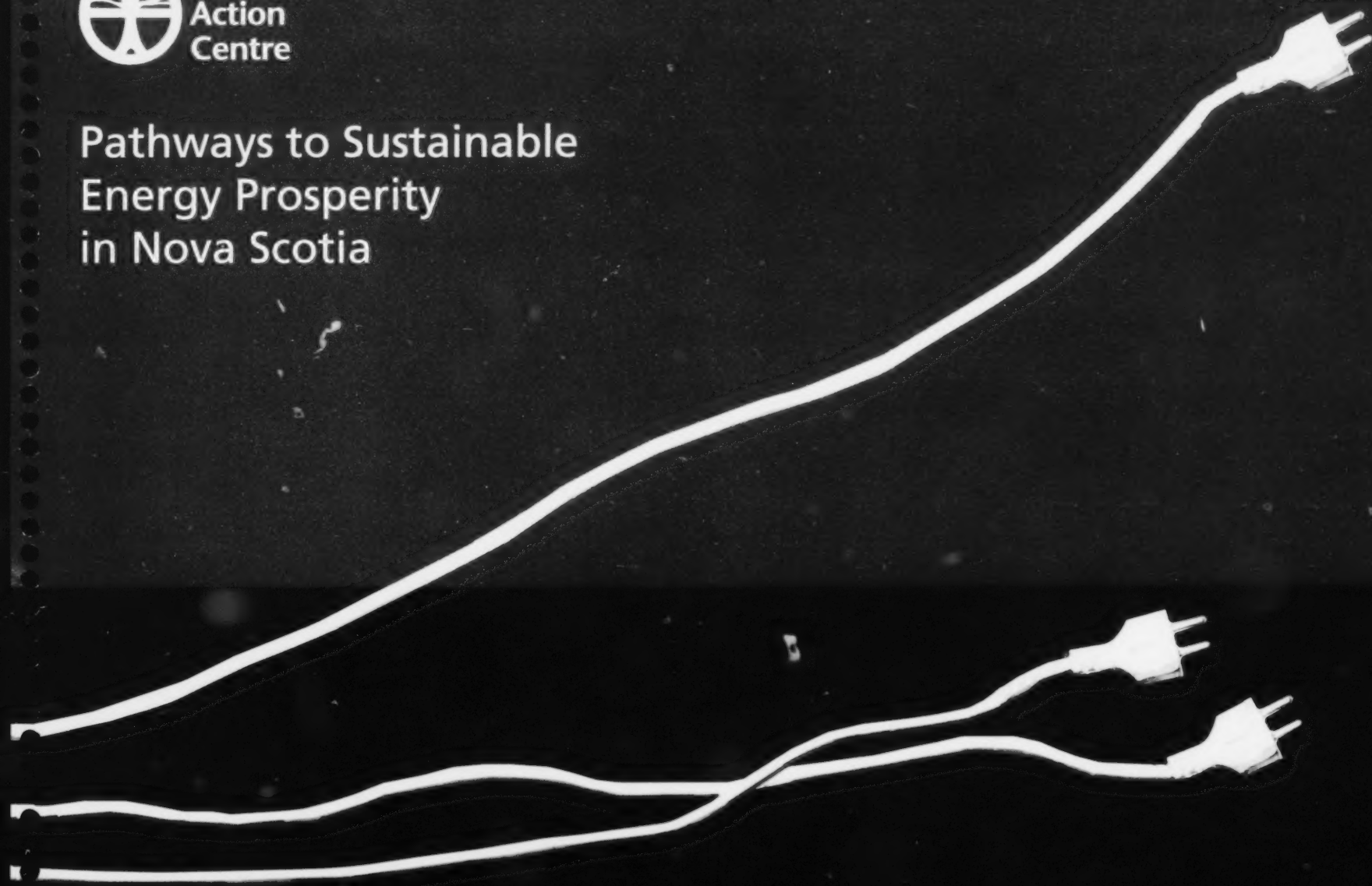




Ecology
Action
Centre

Pathways to Sustainable Energy Prosperity in Nova Scotia



Pathways to Sustainable Energy Prosperity in Nova Scotia

Part of the Atlantic Canada Sustainable Energy Coalition Pathways Series on Climate Change, Energy and Economic Prosperity

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About Us

Atlantic Canada Sustainable Energy Coalition

The Atlantic Canada Sustainable Energy Coalition is an alliance of four community-based environmental organizations that offer expertise in policy research and analysis, project implementation, and public education: the Ecology Action Centre in Nova Scotia, the Conservation Council of New Brunswick, the Environmental Coalition of PEI, and the Sierra Club of Canada – Atlantic Canada Chapter.

Ecology Action Centre

The Ecology Action Centre (EAC) is Nova Scotia's largest and most active environmental organization. Since 1971, the EAC has been working to build a healthier and more sustainable Nova Scotia. Today the EAC has over 1500 members, 250 volunteers and staff and 7 active committees. From its start, the Centre's projects included recycling, composting, and energy conservation, now widely recognized environmental issues. The Coast Magazine has voted the EAC as the Best Activist Organization in Halifax for the past three-years.

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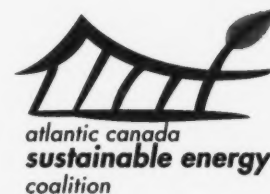




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Preface. Atlantic Canada in a Low-Carbon Future

The sense of urgency has never been greater. Scientists and economists around the world are insisting that failure to achieve deep greenhouse gas reductions and failure to adapt to future climate change impacts will have serious consequences for the economy, ecology and health of our society. Avoiding dangerous climate change requires reducing greenhouse gas emissions by at least 25-30% below 1990 levels by 2020, and at least 80-90% below 1990 levels by 2050.¹

- The Intergovernmental Panel on Climate Change (IPCC), a United Nations body tasked with forging global scientific consensus, has made it clear that climate change is occurring as a result of human activities. The IPCC has shown that the potential impacts are devastating and costly, but that solutions are available and affordable.
- The United Nations Framework Convention on Climate Change (UNFCCC) recognized a) the need for global cooperation to avoid “dangerous” climate change, and b) that industrialized regions have both an historic responsibility and the capacity to act.
- Sir Nicholas Stern, former Chief Economist of the World Bank, has released a review of the economics of climate change in which he warns governments around the world that the cost of inaction will far outweigh the costs of action.
- The European Union has called for an “energy revolution”; agreeing to reduce their emissions 20% below 1990 levels by 2020 unilaterally and to reduce by 30% if industrialized regions, such as Canada, agree to do the same.

In Canada, current federal government climate change policy proposes spurious, intensity-based emission regulations for industry, inadequate reduction targets and an inaccurate portrayal of the economics of climate change action and inaction.²

Atlantic Canada must decide where it will stand in this future. The Atlantic region's coastal location makes it particularly vulnerable to the impacts of climate change. Atlantic Canadians know far too well the hardships of boom and bust economies and the results of high value added industries going elsewhere. We also know that the ecological integrity of our region is profoundly connected to the well being of our communities and industries.

The transition towards a sustainable energy system requires decentralized, community-scale development; it requires knowledge creation, trust and perseverance. Deployment of a comprehensive sustainable energy strategy, with aggressive reduction targets and timelines, will reward our local and regional economies by improving efficiencies, increasing equality, and propelling innovation.

Leading environmental organizations in the four Atlantic provinces have created the *Atlantic Canada Sustainable Energy Coalition* to promote a sustainable energy future, that is rooted in community economic development. The following pages outline strategic opportunities for the Atlantic province of Nova Scotia to fight climate change and to create sustainable, appropriate, economic development for Atlantic Canada.

Atlantic Canada has the reason, responsibility, and opportunity to act now.

Introduction. The "Why" and "How To" of Sustainable Prosperity

Nova Scotians are recognizing that climate change is the defining issue of this century, and for good reason. When it comes to global warming, Nova Scotians are some of the most vulnerable to its impacts, and some of the most responsible for its effects. The citizens of Nova Scotia are also recognizing that they can directly benefit from the implementation of solutions to the crisis.

If the world warms by 2°C above pre-industrial levels, scientists predict significant risk for ecosystems and a large increase in extreme weather events; entering the world into a period of dangerous instabilities that will create potentially unstopplable changes to the climate system.

The economics of climate change are clear. Sir Nicholas Stern, former Chief Economist of the World Bank, has estimated that the costs of inaction would be equivalent to 5-20% of global GDP each year. This disruption in economic activity is on a scale similar to the two World Wars and the Great Depression combined.³ For Nova Scotia, this could mean an economic loss of \$1.6 to \$6.3 billion dollars a year.⁴

Nova Scotia is particularly vulnerable to the impacts of climate change due to its coastal location and the significance of its natural resource sectors such as agriculture, forestry, fisheries and aquaculture. According to the provincial government, 80% of Nova Scotia's coastline is ranked as having a high sensitivity to sea level rise. Further, 70% of Nova Scotia's population live in coastal areas that will be affected by rising sea levels and violent weather.⁵

Stern says we can avoid the most costly impacts if we invest about 1% of GDP a year in measures to cut greenhouse gases.

To avoid 2°C of warming, industrialized nations with the capacity to act, as well as a historic responsibility, need to make greenhouse gas reductions of at least 25-30% below 1990 levels by 2020 and 80-90% below 1990 levels by 2050.⁶

The scientific and economic reality of climate change makes it clear that we must act for the sake of our environment and economy. Nova Scotia recognizes its vulnerability, responsibility as well as the significant economic development opportunities in this century. It's time for Nova Scotia to join, and indeed lead, the rest of the world in the fight against climate change.

Sustainable Prosperity

The world is on the cusp of a wave of innovation; this wave of innovation will focus on the necessity to widely diffuse environmental technologies and social innovations to fight the global climate crisis. To compete in this new economy, jurisdictions need clear, aggressive, and demonstrable environmental goals to attract entrepreneurs and mobilize the public.

The Nova Scotia government has recently recognized the importance of establishing a goal to cut greenhouse gases as well as the significant economic development opportunities that can be created in a low-carbon future. The realization that a region's environmental goals will be

"The benefits of strong and early action far outweigh the economic costs of not acting."

-The Stern Review on the Economics of Climate Change

"...climate change is a meta-environmental issue: if we solve this problem, we may solve many other environmental problems at the same time; if we don't, it may not matter what happens with the others."

-Andrew Heintzman

"Action on climate change will also create significant business opportunities, as new markets are created in low-carbon energy technologies and other low-carbon goods and services. These markets could grow to be worth hundreds of billions of dollars each year, and employment in these sectors will expand accordingly."

-Nicholas Stern
Former Chief Economist
of the World Bank

"The environment is an encompassing focus with which reachable targets, goals and benchmarks can be set that will help drive economic development."

-Nova Scotia Premier's
Advisory Council on Innovation
Interim Report

deeply integrated with its economic competitiveness is expressed in the *Environmental Goals and Sustainable Prosperity Act*², passed in the Nova Scotia legislature in the spring of 2007.

The Ecology Action Centre, as a member of the Atlantic Canada Sustainable Energy Coalition, welcomes the province's vision. We believe that a successful energy strategy will further strengthen Atlantic Canadians' aspirations for appropriate sustainable development.

The *Environmental Goals and Sustainable Prosperity Act* outlined a long-term goal to "demonstrate international leadership by having one of the cleanest and most sustainable environments in the world by the year 2020." To achieve the long-term goal of "international leadership" the *Act* outlined a series of short-term environmental and economic goals.

The purpose of this document is to further the discussion of sustainable prosperity in Nova Scotia's energy sector by identifying the paths that Nova Scotia must follow to meet its environmental goals, while enhancing the economic development of our communities.

Each chapter identifies a strategic opportunity, or pathway, for Nova Scotia in the field of energy sustainability. We outline specific measures focused on achieving both the short-term goals of the province as well as the larger goal of "international leadership".

We consider the policies and practices outlined in this document to be only the first steps on the path to a sustainable energy future. Ongoing strategic planning, evaluation, specific policy development, networking and coalition building will be necessary as scientific, social and economic realities progress.



1. Greenhouse Gas Reductions and Green Competitiveness

In the *Environmental Goals and Sustainable Prosperity Act*, Nova Scotia has committed to reduce greenhouse gases to 10% below 1990 levels by 2020.

The science-based target for industrialized nations necessary to prevent dangerous warming, agreed to by nations such as Norway, Germany and the wider EU, is to cut emissions 30% below 1990 levels by 2020.⁸ As can be seen in the graph below, Nova Scotia can be on track for a 30% target if it starts to aggressively reduce emissions sooner rather than later.

Nova Scotia has important responsibilities, and potential advantages, in a carbon-constrained economy because the province is home to some of Canada's most cost-effective options to reduce greenhouse gases. Economic modelling has shown that Atlantic Canada would make the largest percentage reduction in GHGs, compared to the other provinces, under a system that "caps" GHG emissions and then allows reductions to be achieved in the jurisdictions with the lowest costs, through "trades" of carbon credits.⁹

Under a cap and trade system, Atlantic Canada could be in a position to make larger greenhouse gas reductions, thereby attracting capital inflows from the sale of carbon credits to provincial, national and international jurisdictions with less cost-effective reduction opportunities. In a carbon-constrained economy, regions that can sell carbon credits to others because they have reduced more than their reduction targets will receive extra funding for their transition towards

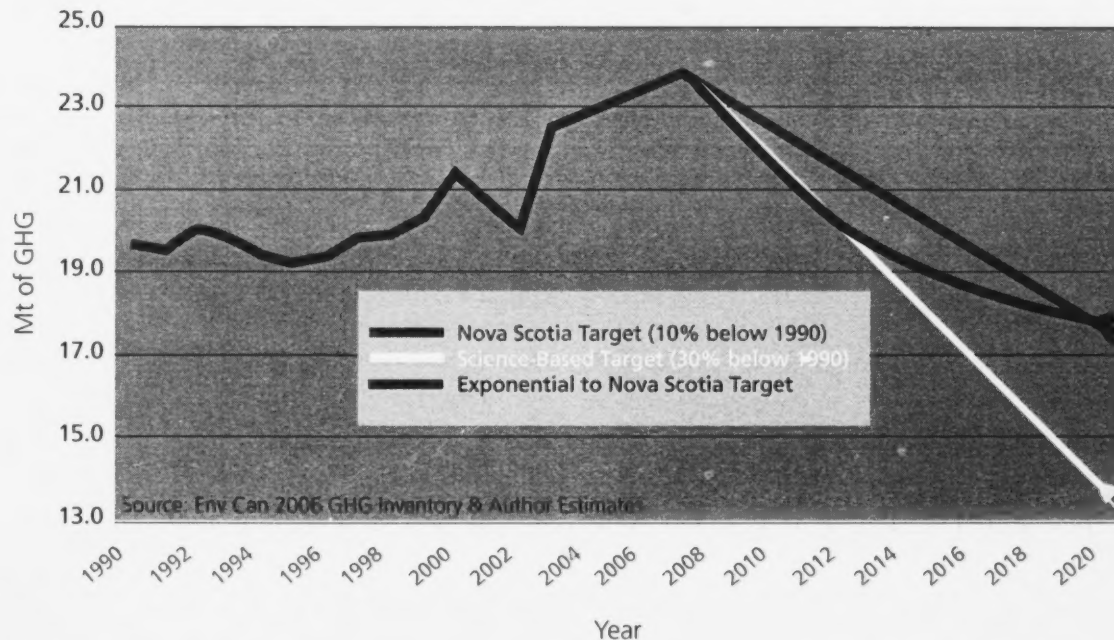
cleaner energy from the regions that must buy the reductions credits.

Nova Scotia will not buy itself into sustainable prosperity. There is no need to, given the availability of cost-effective reduction opportunities and the desire to propel innovation. Nova Scotia can make a business case to the rest of Canada and

the world to support us in achieving substantial GHG reductions.

Atlantic Canada clearly has an important moral responsibility, as well as an economic opportunity to leapfrog other jurisdictions, given the great potential for greenhouse gas reductions within our region.

Nova Scotia GHG Reduction Paths to 2020



Regulation Case Studies: More Profits, Less Waste

Un-innovative companies have often resisted regulations but experience has shown that less pollution means less waste and greater economic benefits.

- Reducing acid rain-causing emissions proved to be a profitable investment for companies like INCO.
- The Montreal Protocol to eliminate chlorofluorocarbons (CFCs), the international treaty that is the model for the Kyoto Protocol, was greeted with predictions of economic catastrophe in 1987. However, Dupont eliminated the production of CFCs, found profitable alternatives, and is now one of the companies leading the way in greenhouse gas reductions.

Regulations: More Innovation, Less Waste

Canada's federal government has proposed a target weaker than Nova Scotia's, coupled with ineffective regulations on large industries.¹⁰ If Nova Scotia accepts the federal government's industrial regulations, it will almost certainly be impossible to meet the provincial GHG reduction target, let alone more aggressive targets.

The federal government's inadequate industrial regulations are of particular concern to Nova Scotia, where electricity production accounts for 46% of the province's overall emissions.¹¹ If the province is seeking out the reduction options that have the lowest costs, the vast majority of reductions needed to meet the provincial target will occur in the electricity sector. Because Nova Scotia's electricity generation is so carbon intensive, it is cheapest to concentrate our efforts in that sector. Unless we focus on reducing Nova Scotia Power's pollution the province will most likely not meet its target, or it will meet the target in a much costlier manner than necessary by making other sectors pick up the slack.

In the absence of serious federal climate change regulations on large industries, Nova Scotia will need to cap the amount of greenhouse gases emitted in Nova Scotia, in partnership with other provinces.

Nova Scotia currently places absolute caps on pollutants such as sulphur dioxide, nitrous oxide and mercury, but there is still no cap for greenhouse gas emissions.

Implementing GHG regulations in Nova Scotia is crucial to bringing the province into this century's economy. Aggressive and consistent rules are necessary to provide the right signals to industry, investors, innovators and entrepreneurs.¹²

Michael Porter, an internationally renowned expert in competition and corporate strategy from Harvard University, has highlighted that clear, outcome-oriented regulations have increased the international competitiveness of regions. This is because such regulations induce companies to reduce wastes and costs, improve production quality and engage in product and process innovations.¹³

In addition, more aggressive regulations generate innovation, thus reducing long-term costs. Aggressive reduction targets mobilize the market by attracting entrepreneurs and investments in research and development. The regions with more aggressive targets and the right strategies to meet those targets will be exporting environmental technologies throughout the world in this century, and dramatically reducing the costs of fighting climate change while they are at it.

Effective regulations avoid picking a winning technology. They set broad, outcome-based goals, such as reductions in annual greenhouse gas emissions, and allow entrepreneurs to find the most effective and innovative means of reaching those goals.

Regional or national strategies can help ensure uniformity, create larger markets, reduce more pollution, and improve certainty. Well-designed

market-based regulations can provide extra rewards to companies and jurisdictions that make deeper cuts to pollution.

To provide market incentives aimed at reducing domestic emissions below the provincial target, Nova Scotia must work towards the implementation of a carbon tax and/or a carbon trading system for large industries. Market-based regulations can

Examples: Market-Based Regulations

Carbon Tax:

A carbon tax is a way of putting a price on global warming pollution. Industries would be required to pay this tax per tonne of carbon dioxide emitted. The revenue could then be used to fund research and innovation within the companies paying the tax or by the province. The 2007 Mitigation Report of the Intergovernmental Panel on Climate Change noted that:

“...real or implicit carbon prices of \$20 to \$50 US per tonne of GHG, sustained or increased over decades, could lead to a power generation sector with low-GHG emissions by 2050.”¹⁵

Carbon taxes send a clear signal to all sectors to find lower-cost options to reduce emissions.

Cap and Trade:

Under this system, the overall emissions that can be legally emitted are designated (capped) at a certain level and then reduced to be consistent

be created in partnership with the other provinces that have also committed to reducing their emissions below 1990 levels by 2020 (Quebec, Ontario, Manitoba, British Columbia), as well as the other Atlantic Canadian provinces that have committed to the same reduction target as Nova Scotia under the Conference of the New England Governors and Eastern Canadian Premiers.¹⁴

with regional or national targets. Companies or jurisdictions that reduce more than their target can sell credits to companies or jurisdictions that have not reduced enough. The initial allocation of pollution credits held by companies are sold or given away by the government.

Cap and trade programs are prone to political and corporate influence and price uncertainty. Tradeable credits must not be created for reductions that would have occurred without regulations. An aggressive cap, oversight and monitoring, and government sale of the initial credits are required to avoid corporate windfalls, gaming and the production of “false” credits.

Given Nova Scotia's potential for cost-effective reductions, the province should attract capital inflows by selling credits if a national or regional system with aggressive caps were established. Nova Scotia also has a direct interest in ensuring that a cap and trade system rewards real reductions in fossil fuel based systems and that false credits are not produced for clean-energy systems that already exist.



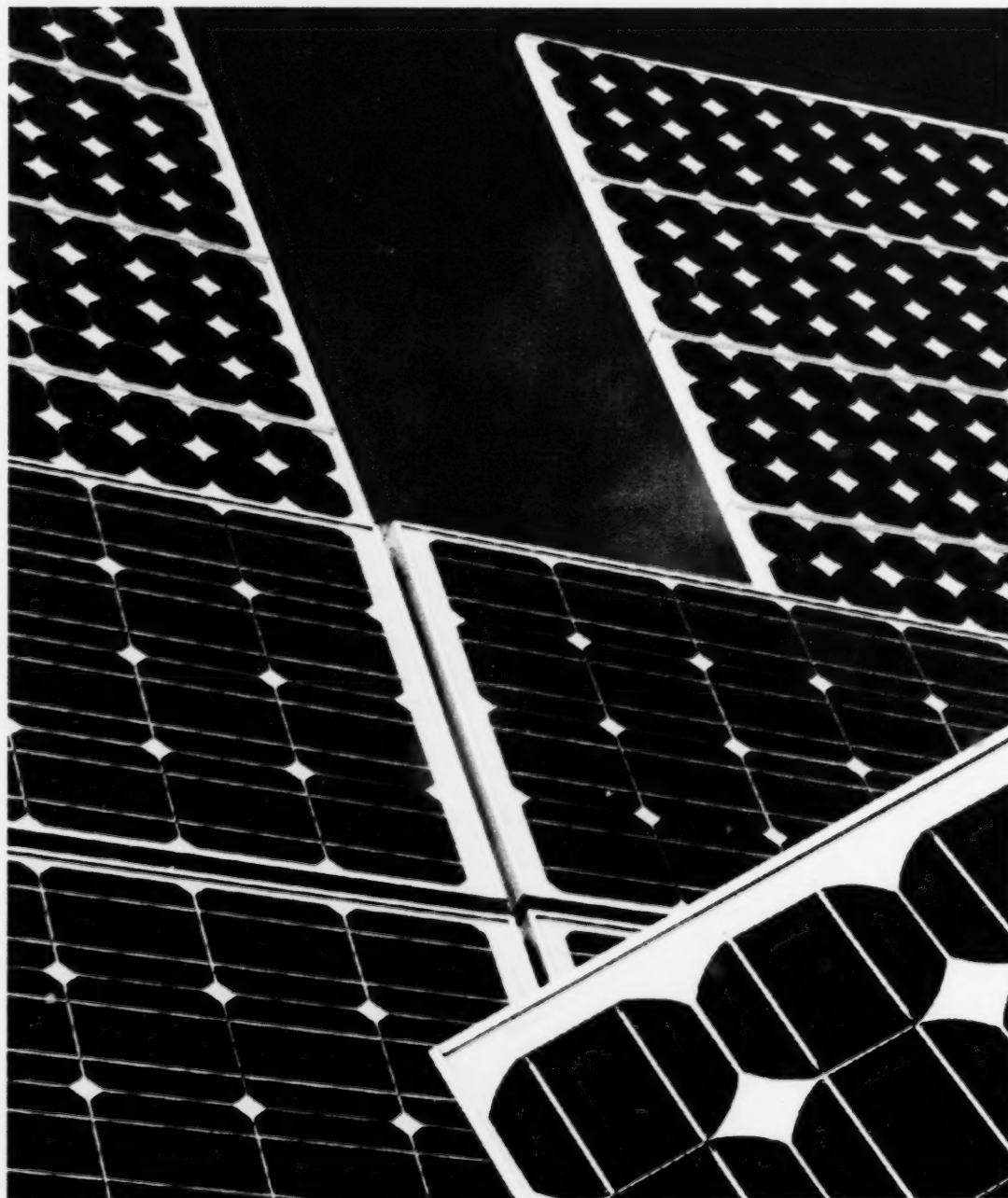
Pathway to Sustainable Prosperity Through Greenhouse Gas Reductions

To Meet Environmental Goals

- Introduce absolute, outcome-oriented regulations on large industries to reduce their emissions by 10% or more below 1990 levels by 2020 through domestic reductions.
- Establish short-term GHG reduction targets with meaningful action for all sectors of the economy.

To Demonstrate International Leadership

- Lead the negotiation of a strong inter-provincial or federal greenhouse gas accord to create market-based regulations that reward further emission reductions in Nova Scotia.
- Induce greater innovation by re-evaluating the adequacy of the 10% greenhouse gas reduction goal to align Nova Scotia with internationally respected, science-based targets for industrialized regions.



2. Energy Efficiency

Tapping Into Nova Scotia's Energy (Efficiency) Resource

The principles of the *Environmental Goals and Sustainable Prosperity Act* state that the management of goals for energy efficiency programs will preserve and improve the province's environment and economy for future generations.¹⁶ The Act also provides Cabinet with the power to introduce and monitor efficiency programs and standards.¹⁷

Energy efficiency is essential in order to meet Nova Scotia's greenhouse gas reduction goals. This is because using energy more efficiently is the most cost-effective solution we have for realizing large reductions in emissions, while saving money for everyone along the way.

Throughout North America, utilities and agencies are implementing concerted, sustained campaigns to improve energy efficiency. These campaigns go house-to-house, business-to-business and industry-to-industry to find the multiple ways energy waste can be eliminated through measures such as energy efficient lighting, insulation, appliances and machinery. Efficiency campaigns provide expert advice and analysis, incentives and financing options, strategic market interventions, community-based social marketing, and standard setting.

When the energy savings from all of these measures are added up we discover the huge potential that exists to cut energy waste. We can view energy efficiency as a resource that is far cheaper than coal, oil and gas, that is abundantly available, that will reduce pollution the more we use it, and that will create jobs throughout the province.

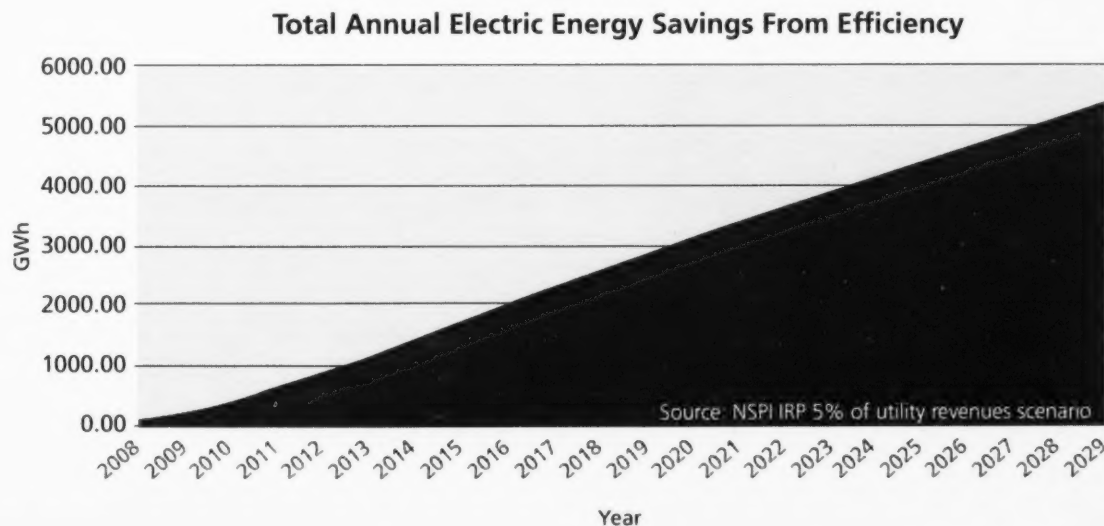
To achieve any GHG reduction goal in a cost-effective manner, Nova Scotia must invest in energy efficiency with the goal of maximizing its economic potential. We need to consider how many energy savings are available, what they cost, and the strategies that will effectively deliver the benefits.

Energy Efficiency – How Much is Out There?

California and Vermont are two jurisdictions that are bringing efficiency to its full, achievable economic potential by ramping efficiency spending up to about 5% of electricity-sector revenues,

equivalent to about \$50 million in Nova Scotia.

Efficiency improvements act like a snowball rolling down a hill: they accumulate over time. If you replace your refrigerator with a more efficient model, you save energy every year until you need to replace it again. If we consider that province-wide energy efficiency programs can help upgrade hundreds of refrigerators every year, we see how important one year is to overall energy saving goals. The graph below shows the energy savings that are possible in Nova Scotia each and every year if we start investing in 2008. Since the savings grow substantially over time, missing out on one year means squandering substantial savings.



Efficiency can deliver a power plant worth of savings by 2020



REALITY CHECK

Canada's per capita energy consumption is the 9th highest in the world.

Canadian per capita consumption is:

- 7% more than the US
- 44% more than Sweden
- 629% more than China
- 2887% more than Ethiopia

Source: 2003 World Resources Institute – total energy consumption per capita

Efficiency in the Year 2020

By 2020, Nova Scotia wants to demonstrate international leadership in sustainability and also deliver the full economic development benefits to Nova Scotia.

Let's consider the extent of electricity savings in Nova Scotia in the year 2020 if we were to start investing in 2008 on par with jurisdictions such as California and Vermont. A recent analysis of Nova Scotia's electricity sector has shown that it is, in fact, extremely economic to make these investment in energy efficiency.

In 2020, the efficiency programs will have saved 3100 Giga-Watt hours *in that year*. This is about 25% of Nova Scotia Power's current annual generation.

By 2020, the savings from efficiency will have amassed 600 MW in power savings. These savings are equivalent to the generating capacity of the Lingan Power Plant, Nova Scotia's largest energy producer and biggest polluter.

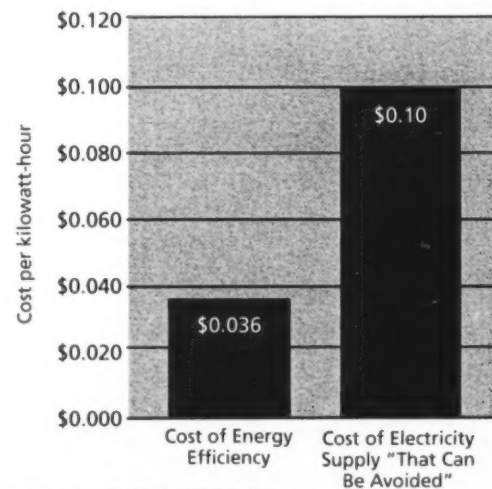
The net lifetime energy savings produced by the efficiency programs running from 2008 to 2020 are estimated to be \$4 billion. Clearly, the economic benefits of these savings are enormous.

How Much Does Efficiency Cost?

The economic benefits of efficiency are substantial because efficiency saves money. This means less money going overseas to buy imported fossil fuels. It means more money spent within Nova Scotia to create jobs and further accelerate the transition towards sustainability.

Consider that it costs Nova Scotia's electricity system about ten cents to produce a kilowatt-hour. If we don't need to produce this kilowatt-hour the costs of the entire electricity system are reduced because there is no need to generate the power by burning fossil fuels or building power plants. Now consider that the same kilowatt-hour can be saved through efficiency programs at an estimated cost of about 3.6 cents (see cost comparison below). Thus, saving energy costs 64% less than producing it. And this is without taking into account the important environmental and social benefits.

**A Cost Comparison
Between Efficiency & Supply**



Source: NSPI IRP and DSM data

Through programs that cut energy use by providing advice, incentives and financing, energy efficiency not only saves money for homeowners, businesses and industries by directly cutting their energy bills, but it also reduces the need to build power plants, generate energy and transport it over transmission lines. The overall costs of the electricity system are further reduced and electricity rates are stabilized in the future.

Obviously, it makes sense to invest in energy efficiency since it is cheaper than building power plants and burning fossil fuels. It makes even more sense when policymakers consider the substantial environmental and social benefits of efficiency.

How Do We Deliver Energy Efficiency?

Utilities, government agencies and third parties are each delivering energy efficiency programs in other jurisdictions.

Utilities can encounter conflict of interest problems, because efficiency programs tell consumers to use less of their product. Regulatory measures have attempted to alleviate this problem, with varying degrees of success.

When government agencies deliver efficiency programs, they might not be held fully accountable for maximizing energy savings in a manner that ensures regional and social equality unless clear objectives, oversight, political independence and incentives are established. They can also become under funded or have their budgets raided. The expedient political gain of raiding an

efficiency fund to give a tax cut can cause severe and irreparable damage to long-term energy efficiency programs.

The Ecology Action Centre supports an independent, consistently funded, energy efficiency agency, with accountability mechanisms in place to ensure energy saving performance. The new energy efficiency agency, *Conserve Nova Scotia*, will require administrative changes if it is to play this role.

Dedicated and secure funding for energy efficiency programs can be provided through a small energy efficiency charge on utility bills (far less than one half-cent per kilowatt-hour and 2 cents per litre of oil). The annual cost to the average Nova Scotian household can be recouped by changing 2 to 6 incandescent light bulbs to more efficient compact fluorescents.

Invest in Energy Efficiency

While there are obvious monetary and energy savings, the public benefits are actually the most important. Efficiency reduces both air and carbon pollution. Efficiency is one of the most effective ways to cut energy costs for low-income Nova Scotians, thus reducing energy poverty. Energy efficiency improves international competitiveness by reducing business costs, and it creates opportunities for new product and process innovations in new technologies. Finally, energy efficiency creates 37 jobs for every \$1 million invested. That is five times more employment "bang for the buck" than conventional energy projects.²⁰

Case Study: Small Business Energy Advantage Program in Connecticut

Compare Foods is an independent grocery store in Bridgeport, Connecticut, that wanted to cut costs and increase profits.

The grocer received a walk-through audit to determine energy inefficiencies in his store. The inspection identified two areas for improvements: lighting and refrigeration.

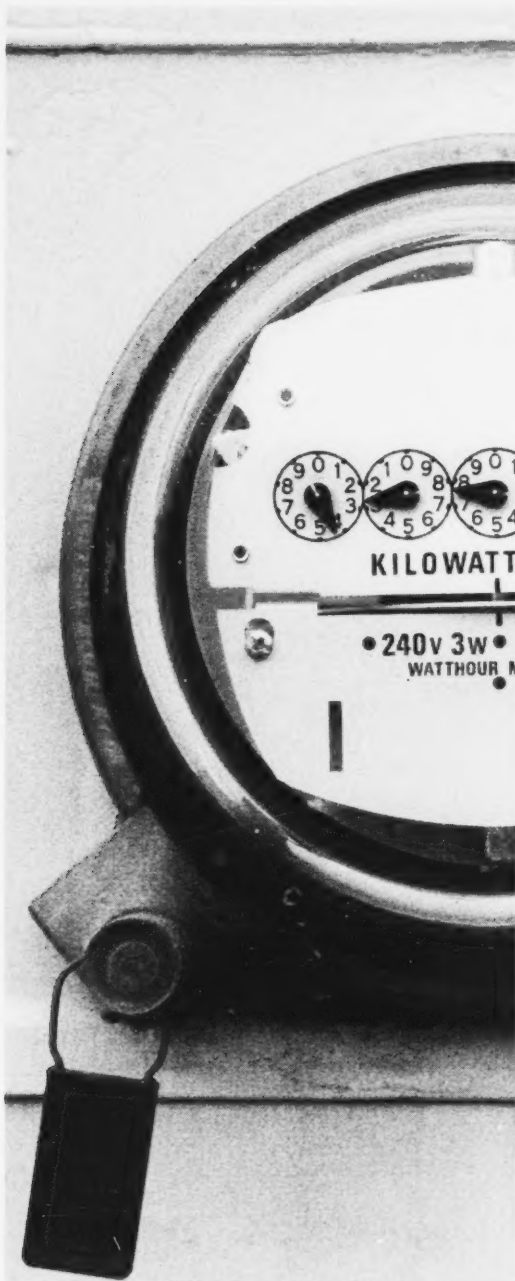
The lighting improvement project involved equipping the overhead fixtures with more energy efficient T8 fluorescent bulbs, electronic ballasts and metallized reflectors to make the store brighter. The refrigeration project involved installing computerized control systems to govern both the evaporator fans used by the store's dairy, produce and meat walk-in coolers and the door heaters on the in-store freezer cases.

The business received a \$12,210 cash incentive to apply against the \$31,950 project cost. The balance was financed through a 28-month loan that was also available through the efficiency program.

The project has helped reduce energy use by 101,750 kilowatt-hours, saving \$10,886 a year for the business. The store's energy use has also dropped by an average of 17% per month.

The program administrator is now looking to go back to upgrade to next-generation LED lighting and to make further improvements. Energy efficiency is a continuous process – not a one time measure.

Personal interview and Adapted from 2005 Connecticut Energy Conservation and Management Board Report



With so many benefits, it is a wonder that Nova Scotia is not already investing heavily in energy efficiency.

The inability to tap into the vast resource of energy waste in our province is due to the inadequacy of existing regulations and incentives. Nova Scotia Power is rewarded when we use more energy instead of less, and efficiency is not regularly considered a resource in electricity system planning. Nor have we moved to maximize energy savings for heating oil.

For sustainable prosperity, Nova Scotia must maximize its potential for cost-effective energy savings. By investing in energy efficiency, all Nova Scotians will save money through lower bills and lower costs on the electricity system. We can help meet our pollution reduction targets, combat global warming, create jobs throughout the province, compete in the global economy and fight energy poverty. To achieve these substantial benefits year-after-year, Nova Scotia needs to start making investments in effective programs as soon as possible, or the province will miss out on key opportunities.

Pathway to Sustainable Prosperity Through Energy Efficiency

To Meet Environmental Goals

- Commit, in legislation, to making all energy efficiency improvements that are cost-effectively achievable, for all fuel types.
- Develop a clear business plan to maximize energy efficiency in all sectors and for all fuel types.
- Ensure accountability for achieving efficiency improvements:
 - Establish energy efficiency charges on utility bills and a legislative guarantee against funding raids;
 - Establish specific, aggressive and realistic targets related to energy savings, market transformations, and equal service provision;
 - Establish a properly-resourced stakeholder management board that will help develop efficiency business plans;
 - Sign performance-based contracts with efficiency delivery agent(s) with incentives and disincentives associated with meeting targets.

To Demonstrate International Leadership

- Work regionally to make Atlantic Canada's economy the most energy efficient in the world through sharing of best practices and industrial innovations.

3. Combined Heat and Power: Recycling our Energy

Nova Scotia prides itself on being a leader in waste diversion and recycling. It is time to start recycling our energy too!

Two-thirds of the energy in the fuel that goes into conventional electricity generating stations disappears as waste heat or is lost in transmission line losses. For instance, the Tufts Cove generating station on the edge of Halifax Harbour generates electricity by boiling water to turn a turbine. About two out of every three barrels of oil (or equivalents) produce hot water that goes directly into the Bedford Basin as "waste".

But we can recycle this so-called waste to heat our cities and towns. Combined heat and power stations, or cogeneration plants capture this "waste" heat to either distribute through a series of pipes for heating or to use in electricity production.

Industrial, institutional and commercial facilities burn large amounts of fossil fuels to produce heat, but throw away the potential to generate electricity that could be sold into the grid.

We could heat the peninsula of Halifax with the waste heat currently dumped into the harbour by Tufts Cove.²¹ We could also give businesses the opportunity to generate their own electricity. Nova Scotia companies can make money by selling electricity to the grid. As we reduce the waste we will create skilled, long-term jobs in local combined heat and power plants.

To kick-start energy recycling, local combined heat and power plants that could sell excess electricity will need access to the electricity grid

at prices that encourage development, and Nova Scotia Power will require regulations and incentives to start making use of the waste heat in our power plants.

Pathway to Sustainable Prosperity Through Combined Heat and Power

To Meet Environmental Goals

- Recycle energy through combined heat and power.
- Provide businesses and communities with access to the grid at prices that encourage combined heat and power.
- Create regulations and incentives to encourage the utilization of waste heat from thermal electricity plants.

"A review of the international literature on low emission futures reveals cogeneration to be second only to improved efficiency in the size of the contribution it can make...in the short to medium term it is the potential for increased industrial cogeneration that looms largest."

-Ralph Torrie &
Richard Parfett

*Phasing out Nuclear Power in
Canada: Towards Sustainable
Electricity Futures*

4. Transportation: Moving the Economy

Transportation is essential for economic and social life. Transportation in a sustainable economy must focus on reducing emissions, improving health and increasing mobility. A transportation strategy for Nova Scotia requires regional, urban, and rural solutions. It requires new community design, fewer vehicle miles travelled and support for our local goods and services.

The transportation sector – moving people and goods – accounts for 27% of Nova Scotia's GHG emissions. Achieving GHG reductions in the transportation sector can improve health, well-being and productivity.

The Environmental Goals and Sustainable Prosperity Act includes a specific reference to the implementation of California vehicle emission standards, which require average fleet GHG reductions of 23% by 2012 and 30% by 2016. Compared to providing rebates for the purchase of vehicles, the implementation of such regulations is a more cost-effective and comprehensive method of achieving fleet vehicle emission reductions.

In addition to substantial GHG emission reductions, the David Suzuki Foundation has calculated that the implementation of such standards would benefit consumers. While the upfront cost of a vehicle would increase \$400 to \$1,200, the sav-

ings in fuel costs over the life of a vehicle would be \$3,500 to \$5,000.²²

Nova Scotia will join a host of other states and provinces in adopting this standard. Ten other American states have adopted California's standards, including several New England states: Connecticut, Maine, Massachusetts, Rhode Island and Vermont. Of these states, Rhode Island and Vermont have populations similar in size to Nova Scotia. In Canada, Quebec spearheaded the introduction of vehicle emission standards in its 2006 Climate Change Plan.

Moving People - Transit Infrastructure

Viable transportation options and smart community planning are as important as vehicle standards to reduce emissions from the transportation sector. Community planning and transportation are integrally linked.

In 2006/07 Nova Scotia invested \$0.69 per capita in transit: the third lowest level among the Canadian provinces. During the same period, the average level of investment among Canadian provinces was \$24.09 per capita and the median investment was \$10.38 per capita. The need for increased investment is clear.

Nova Scotia's entire \$650,000 regular annual investment in transit has created the Community Transportation Accessibility Program (CTAP). Unique among the Atlantic Provinces, CTAP provides funding to small-scale wheelchair accessible operations in rural areas. This is an excellent initiative that could be expanded to all citizens in rural and small towns.

The Nova Scotia Department of Energy and Conserve NS have provided one time capital grants to transit initiatives, such as the Halifax Region's development of the MetroLink service and purchase of hybrid diesel vehicles, and Cape Breton Transit's university hub. Such investments are vital and need to be entrenched. There is a need for a stable annual source of provincial funding for both capital and operating costs.

When transit investments are made, Nova Scotians respond. For example, the Halifax Regional Municipality's MetroLink rapid transit service was expected to reach capacity in three months. Instead, it reached capacity within one week. More importantly, 22% of the passengers formerly drove to work alone. This is a major modal shift that yields significant personal GHG reductions.

"...the expected growth in the number of vehicles on the road and the corresponding increase in miles traveled mean that further action will be needed to control emissions from passenger vehicles."

-California Clean Cars Campaign

Moving People – Active Transportation Infrastructure

Investments in active transportation modes, particularly walking and cycling infrastructure, yield savings for the health care system. Obesity costs the provincial health care system \$120 million per year, equivalent to 7% of the provincial health budget.²³ The rate of obesity is increasing. As of 2000, 38% of Nova Scotian adults were overweight compared to 18% in 1985.²⁴ This trend may be worsening: the physical activity levels of grade 11 boys and girls decreased from 13% to 10% and from 7% to 0.6%, respectively, between 2001 and 2005.²⁵

Active living must be encouraged by providing opportunities for physical activity, whether for recreation or for active transportation to school, work and play. Investments in the construction and maintenance of sidewalks, on-road cycling lanes and off-road cycling paths, as well as investment in supporting infrastructure, such as bike racks and “Share the Road” signage are needed.

Transport Quebec, the equivalent of the NS Department of Transportation and Public Works, employs 16 bicycle coordinators throughout the province. The coordinators are responsible for overseeing the regional design and implementation of cycling infrastructure. Their coordinated effort has resulted in the development of a comprehensive 4,000 km provincial cycling network, including bike paths and designated shared roadways, marked by signs along its full length. Transport Quebec has invested \$8.5 million annually in the network’s development.²⁶

In addition to health and environmental benefits, investments in active transportation play a key role in developing tourism opportunities. Other regions in North America have developed designated cycling routes that have delivered economic benefits and high quality travel experiences.

Community Planning

The way cities and towns are designed directly impacts how much energy is used. In communi-

ties where opportunities to work, shop, and play are within walking or bussing distance, citizens choose to leave their cars at home – or not buy a car at all. But, according to GPI Atlantic, Nova Scotia’s urban density diminished by 36% between 1971 and 1996 – one of the sharpest declines in the country.²⁸

It is important for the province to closely work with municipalities to fully incorporate transportation efficiency into land use planning. Building walkable, attractive, safe and vibrant communities is an important component in attracting knowledge workers to Nova Scotia. If Nova Scotia wants to be known for its quality of life, people-focused community planning and transit infrastructure are essential.

Moving Freight

If Nova Scotia desires to be the “Atlantic Gateway” we first need to seriously consider how to transport goods in a sustainable fashion. Nova Scotia will need to champion the development

Economic Benefits of Cycling Infrastructure Investment²⁷

Trail	Construction Cost (M)	User Spending per Year (M)	Yearly Return on Investment	Users per Year	Jobs
Welland Canals Trails – Ontario	\$2.5	\$12.0	480%	150,000	NA
La Route Verte – Quebec	\$88.0	\$95.4	108%	NA	2000
Trans Canada Trail – Alberta	\$6.5	\$6.8	104%	37,000	160
Celtic Trail – UK	\$27.3	\$36.0	132%	200,000	1000
Tarka Project – UK	\$1.7	\$46.1	2656%	483,000	481



of national and regional sustainable transportation networks, which utilize rail. Mass-transit manufacturers such as *TrentonWorks* can be reinvigorated if Nova Scotia champions a rail-based transportation network.

Constructing one kilometre of rail costs the same amount as constructing one kilometre of highway - \$1 million. However, the external costs of rail are much lower. Transporting one tonne of freight by rail emits approximately 15 grams of GHGs compared to 180 grams by truck.²⁹ Moreover, transporting freight by rail reduces wear and tear on roads as damage to pavement occurs as a result of repeated loads from truck traffic.³⁰

Going Local

As we consider a carbon-constrained future Nova Scotia needs to think carefully about what needs to move and how we move it. Buying locally produced goods is an important way to cut down on transportation costs, while supporting our local economy. By encouraging Nova Scotians to buy locally we can help foster entrepreneurship, support community-based businesses, increase employment opportunities, and keep our dollars in local communities.

Some of the more commonly discussed buy-local initiatives focus on local food. A study of 58 food items that could have been produced within the Waterloo Region of Ontario found that they, instead, traveled an average of 4,497 km and generated 51,709 tonnes of GHG emissions, representing 6% of total emissions generated by

households in the Waterloo Region.³¹ Producing these food items locally would have reduced the associated annual greenhouse gas emissions to between 267 and 2,224 tonnes.³²

When we buy local we support our local farmers and businesses. It means less money flowing out of our economy and a more vibrant community.

Pathway to Sustainable Prosperity through Sustainable Transportation

To Meet Environmental Goals

- Legislate California Vehicle Emission Standards.
- Increase provincial per-capita investments in transit and active transportation capital and operating expenditures to the Canadian average.
- Implement aggressive campaigns and policies to make, grow and buy local.

To Demonstrate International Leadership

- Utilize smart design principles to develop energy efficient, safe, healthy, and vibrant communities.
- Champion the development of national and regional sustainable rail transportation networks.

5. Renewable Energy

Opening the Market for Innovation and Rural Revitalization

The *Environmental Goals and Sustainable Prosperity Act* commits Nova Scotia to having 18.5% of the total electricity needs of the province obtained from renewable energy sources by 2013. A recent analysis of Nova Scotia's electricity system has shown that it is very economic to double this goal between now and 2029.³⁴

The *Act* is also committed to the principle of economic prosperity and accountability in meeting its goals.

Thus, the questions Nova Scotia must answer regarding renewable energy are:

- 1) How do we make sure we meet the renewable energy goal?
- 2) How do we meet the production goal in a way that maximizes economic development benefits?
- 3) How do we increase the amount of renewable energy beyond the legislated goal?

Economic Development Benefits of Renewable Energy

Renewable energy projects utilizing sources such as wind, solar, tidal and small hydro provide the potential for local community economic development. Renewable energy can be developed to create many medium-scale installations, each requiring medium-scale capital investments, distributed throughout the region. The inherent scale of renewable energy makes it possible for local communities to become active owners and developers.

The potential exists for farmers, co-ops and mu-

nicipalities to finance renewable energy projects, pay off their initial investment and then start earning net returns from the revenues provided by the sun, wind and water. This has been the experience in Denmark, where local community members own 85% of all renewable energy developments.

Nova Scotia's geography provides us with one of the best wind and ocean energy regimes in the world, along with good potential for solar energy production. The province's rural communities are also in need of opportunities to earn extra income in order to reverse out-migration.

Renewable energy projects are generally best located close to where energy is used and dispersed in order to catch the renewable resources when they are available. Numerous local renewable energy installations are more efficient than a few large projects in a small number of locales. This also allows for jobs, as well as income flows, to be spread throughout the province.

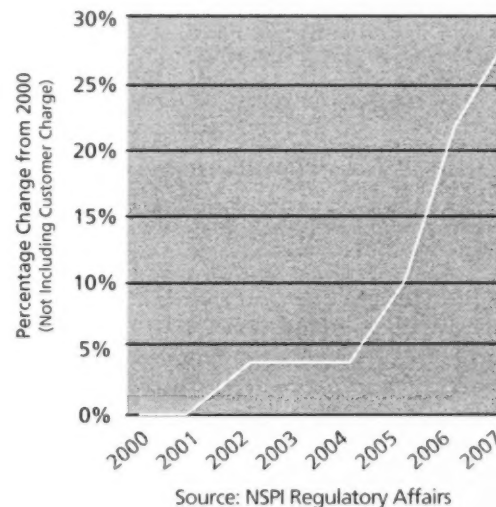
In addition, renewable energy provides economic diversification by allowing farmers and others to supplement their income. It creates new skills because renewable energy projects require plumbers, electricians, designers, architects, and engineers, as well as specialists in particular fields, such as wind power.

Renewable energy means more money flowing into our local communities and less going towards buying imported fossil fuels.

Fuel prices have been increasing year after year, but renewable energy would insulate Nova Scotia

from international fuel price volatility. After the initial investment is made, there is no fuel cost. This allows us to fix the price for renewable energy for 15-20 years into the future. When we buy renewable energy it delivers long-term rate stabilization and the benefits from our purchases stay within the province.

Domestic Electricity Rates in Nova Scotia



Since 2000, domestic electricity rates have increased 28% to pay for Nova Scotia's fossil-fuel based system, and they are almost guaranteed to keep going up, given tight and volatile international energy markets.

How Can We Increase Renewable Energy Generation?

To go well beyond the current renewable energy goal, Nova Scotia needs to consider policies and technologies that can cope with the intermittent nature of wind and solar power. There are a variety of measures that can be explored to maximize our use of renewable energy:

- Work with provinces and states within the region to have renewable energy sources balance each other. By working as a region, we'll catch the wind when it is blowing and smooth out the overall intermittency of renewable energy on the regional system;
- Consider linking to hydropower resources in other parts of Canada to back up renewable energy;
- Distribute renewable energy and combined heat and power installations throughout the region as much as possible;
- Systemically upgrade the transmission and distribution system;
- Undertake regional research and innovation into energy storage (e.g. PEI wind-hydrogen village).

These are the reasons why organizations like the Ecology Action Centre and Nova Scotia's Co-operative Council³⁵ see a key opportunity for rural revitalization through renewable energy. We are calling for an integrated approach to renewable energy development and a reduction in barriers to community-scale energy development.

The Current System and Its Barriers

Currently, renewable energy producers can sell their product only when Nova Scotia Power (NSPI) requests proposals. When a request for proposals is made, producers bid against each other to win the contracts. This system has two major drawbacks.

The first is that experience across North America has shown that 50% of contracted projects are not built.³⁶ One of the major reasons for this "contract failure" is that producers cannot find financing because they engaged in under-bidding to capture the contract in the first place. Under the current system, Nova Scotia Power has thus far missed a voluntary target of 50 MW in 2005, and the targets were again missed in 2006 after the cancellation of a 31 MW wind farm in Amherst.

The second problem is that only the "big dogs" can participate in the market because of the sophisticated gaming and significant financial uncertainty involved in the bidding process. This means Nova Scotia farmers, rural communities, and municipalities, all in need of extra income and with land waiting to be utilized, are being excluded from selling clean energy. Instead of hav-

ing economic development opportunities flowing to the communities and residents that need it most, the benefits from Nova Scotia's renewable energy resources are flowing elsewhere.

This system also excludes emerging industries such as solar, wave, and tidal power that cost more today because they are in earlier stages of innovation. It means Nova Scotia is missing out on opportunities to gain experience in cutting-edge green technologies.

The current renewable energy policy is resulting in the exporting of an infinite and never-ending value stream of renewable energy resources out of the province because our local communities are excluded from the market. This is unacceptable given the potential for community economic development. Sustainable prosperity is about ensuring that a substantial amount of the financial and other benefits of renewable energy stays within Nova Scotia.

Electricity Feed-In Tariffs – A Standard Fair Price to Power Renewables in Nova Scotia

The leading jurisdictions in renewable energy have opened up their markets to rural communities and emerging technologies through the use of an electricity feed-in tariff, sometimes referred to as an "advanced renewable tariff" or "standard offer contract".

Under a feed-in tariff, the price for every kilowatt-hour of renewable energy generated is fixed at a price that is necessary to spur development. A dif-

ferent price can be paid for different technologies (e.g. wind, solar, tidal) and for areas of the province with differing amounts of renewable energy resources (e.g. windier areas of the province).

Experience elsewhere shows that feed-in tariffs have been the most important policy mechanism to ensure the accomplishment of renewable energy targets while simultaneously delivering sustainable social and economic development benefits to communities and citizens.

More than 30 countries worldwide have implemented feed-in tariffs. The leadership of Germany, Spain and Denmark in wind and solar is largely attributable to the feed-in tariffs in those countries. In March 2006, the Government of Ontario introduced a feed-in tariff, and the Government of British Columbia has included it in their strategy to reach the same greenhouse gas reduction target as Nova Scotia.³⁸

Feed-in tariffs have resulted in the installation of eight times more wind capacity than the system Nova Scotia currently uses to buy renewables.³⁷ If we are serious about meeting our renewable energy target, we cannot accept the failure rates that have plagued other jurisdictions and that are starting to occur in our province.

A feed-in tariff would also open up the market for Nova Scotia's rural communities by clearing administrative and financial hurdles. If the application process were simplified, a community could access loans with added financial certainty. Communities would be able to secure the funds

to set up a wind turbine and then pay off its up-front costs by selling energy to the grid. With no fuel costs, Nova Scotia's communities would be able to make money whenever the wind blows or the sun shines.

Encouraging local ownership has been instrumental in the widespread development of renewables because it garners local support. With communities as active participants who hold a direct stake in renewable energy, there is less of a "not in my backyard" attitude towards renewable energy projects.

Finally, feed-in tariffs open up the market to emerging technologies in earlier stages of innovation. In Ontario, solar technologies receive a price of 42 cents per kilowatt-hour to create a niche market that will further the development of this technology. This allows Ontario to build the consumer-producer linkages crucial for long-term innovation and eventual bid-down of costs and prices.

Meeting our renewable energy target in a way that maximizes economic and social development requires an evaluation of the full benefits of renewable energy. We must recognize the potential for renewable energy to revitalize our rural communities by letting them become energy producers themselves. Rural revitalization, reduced pollution, and stabilization of long-term power rates will help deliver sustainable prosperity to Nova Scotia.

Policy to Bolster Renewable Energy and Economic Development

Electricity feed-in tariffs

Access to the grid at the fixed and fair price needed to spur development.

Financing support

-In Nova Scotia investments in Community Economic Development Investment Funds (CEDIF) are eligible as a RRSP contribution and for an equity tax credit.

-Other mechanisms such as revolving loan funds and government loan guarantees could also be provided.

Loan Financing Sources

e.g. Credit Unions

Renewable Energy Resource Centres

To help communities with technical, financial, resource, interconnection, site and permit issues.

Renewable producer access to consumer markets

Research and innovation strategies

-For solar, ocean, energy storage and next-generation wind (larger, lighter and offshore).

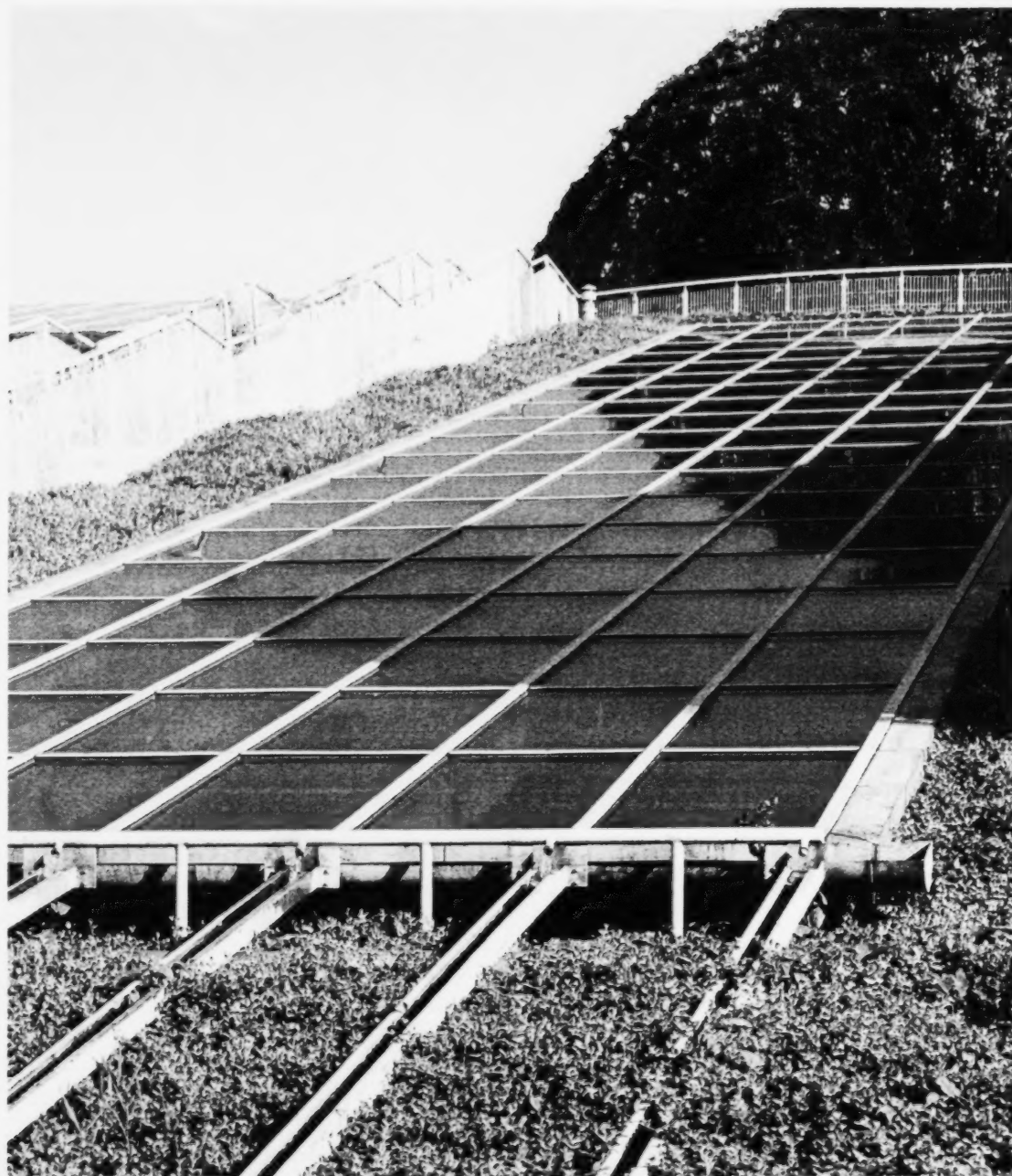
Pathway to Sustainable Prosperity Through Renewable Energy

To Meet Environmental Goals

- Re-evaluate the current, single-minded, renewable energy procurement policy in light of new environmental and economic development goals.
- Develop policies that create opportunities for municipal and community ownership of renewable energy developments.
- Open renewable energy markets up to rural communities and emerging technologies by implementing an electricity feed-in tariff.

To Demonstrate International Leadership

- Expand the amount of renewable power through regional cooperation.



6. Sustainable Energy Innovation: Emerging Industries and Knowledge Creation

The Premier's Advisory Council on Innovation has recommended that Nova Scotia focus on the environmental economy by setting a high-level goal aimed at making the province a leader in environmental sustainability.³⁹ The Council was not tasked with an environmental mandate, it was asked to point the way to economic prosperity through innovation.

Innovation is a process aimed at creating new or improved products, services and practices for commercial use and/or the public good. Economists refer to certain periods or 'waves' of innovation, each defined by particular "base industries" that drove economic development through radical and incremental changes. In the 19th century the base industries were steam and the railway; in the 20th century it was arguably oil and the automobile. What the Nova Scotia Premier's Advisory Council has recognized is that the 21st century will be defined by our responses to environmental challenges.

Decentralized, sustainable energy systems are blessed with characteristics that provide substantial opportunities for innovation. The small scale and quick development times of renewable energy and energy efficiency projects provide ample opportunities for experimentation. The complex nature of environmental and energy-related problems requires that different disciplines work together to create new knowledge. The desired public benefits invite public acceptance, mobilization and involvement by both market and non-market players.

The process of social innovation and the shepherding of new technologies to market are essential for fighting climate change; it could also keep Nova Scotia ahead in a carbon-constrained economy. However, since innovation often threatens older, more established industries, such industries could attempt to erect both political and market barriers to block newer, greener technologies to the detriment of a region's long-term economic development.

Innovation only works if everyone is allowed to participate. Chris Freeman and Luc Soete, in *The Economics of Industrial Innovation*, explain that environmental innovation aims to encourage "frequent evaluations of a developing technology by a large number of researchers or potential users."⁴⁰ They further suggest that innovation policy:

"permits a range of firms and research institutions to conduct parallel research projects in a given technology in order to increase the opportunities for a large number of people to evaluate the technology critically, either through the rigours of the market or through non-market means, and to use the results of these evaluations to guide further technical developments."⁴¹

They suggest avoiding "overinvestment in a limited range of expensive technologies that are later found to be unworkable, overly expensive, or environmentally more harmful than the technologies they were designed to replace." They caution against limiting "the number of participants to a few technically advanced firms or research institutes".⁴²

Green innovation is a great thing, but it does not happen on its own, and it does not happen in isolation, or in the backrooms of corporations and governments. First, policies that signal that Nova Scotia is walking down a different, low-carbon path are required. Second, we must realize that successful innovation strategies concern themselves more with process than final results. It is walking down the path and learning from others along the way that delivers the benefits we want at the end. And finally, the province must establish a welcoming framework for transition and restructuring by ensuring inclusion and equity for Nova Scotians, while refusing to succumb to the opponents of change.

Opportunities for Sustainable Energy Innovation in Nova Scotia

Nova Scotia is well positioned to innovate in the sustainable energy field, given its smaller scale, its resources and the nature of its university sector.

Traditionally, the small size of Nova Scotia's population and institutions has been a disadvantage. It has been difficult for universities and companies to attract large amounts of research funding.⁴³

However, Nova Scotia's geographically distributed university sector can complement the geography associated with sustainable energy development. Linking our universities with local communities to experiment and develop knowledge about sustainable energy systems is an opportunity too promising to miss out on.

"...the stakes in the shift to renewable energy involve nothing less than the most thorough and far-reaching structural change since the beginning of the Industrial Revolution."

**-Herman Scheer
Energy Autonomy**

Focus areas in which Nova Scotia could develop research, development and innovative advantages exist in tidal and wave power, solar energy, as well as carbon capture and storage technology.

Ocean Energy

A most exciting emerging technology for Nova Scotia is the use of ocean energy, given the mighty tides of the Bay of Fundy. The tides can provide a measurable, predictable and clean source of power. The province is rightly targeting ocean energy as a potential economic development opportunity.

A research and development (R&D) and innovation strategy for ocean energy must first and foremost focus on the full pursuit of knowledge. It must allow us to fully evaluate multiple technologies for their social, environmental and economic merits and it must be open to the numerous potential knowledge spin-offs that can occur in a variety of areas.

Nova Scotia would be wise to heed the expert advice on the economics of innovation mentioned above. We must recognize that much is still not understood on a number of issues: the nature of the Bay of Fundy ecosystem; the full environmental effects of ocean energy; the social and institutional implications of these new technologies; and which ocean technology is most effective. These questions pose difficulties, but they also pose opportunities for Nova Scotia to explore a variety of exciting and unpredictable areas of knowledge.

Our universities are well placed to coordinate re-

gional ocean energy R&D and innovation forums that would offer a safe space for the development of knowledge.

It is important to not mistake the actions of one company for an adequate innovation policy. A single company has little interest in the pursuit of knowledge spin-offs. Nova Scotia Power Inc. (NSPI) has thus far picked a preferred technology and submitted a funding proposal to the federal government for its development. While there is certainly nothing wrong with NSPI taking this step, it is unclear as to whether this single technology will meet important environmental, social and economic objectives. Since NSPI has ownership rights over the electricity system it leaves one to wonder if there will be room for anyone else.

It is the government's responsibility to ensure that Nova Scotia convenes a comprehensive exploration of all options. We need lots of experimentation, cooperation and a certain degree of competition to pick the technology that will work best. It is experimentation and a quest for knowledge that will most effectively and rapidly develop ocean energy.

Solar Power

The amount of solar energy intercepted by the earth every minute is greater than the amount of energy the world uses in fossil fuels in a year. There are high returns for anyone who can tap this energy source.

Nova Scotia has been innovating in this field. A good example is *Thermodynamics Inc.*, an export-

oriented solar hot water manufacturer that developed out of research at Dalhousie University. *Thermodynamics Inc.* is now being joined by businesses such as *Encom*, *Green Power Labs Inc.* and the non-profit, *Solar Nova Scotia*. The potential exists in the province to develop a solar energy cluster of innovation that would seek to link businesses, universities, unions, and consumers in an effort to further develop solar technologies.

Carbon Capture and Storage

To combat global warming, we can cut our energy use through energy efficiency and use forms of energy that create zero emissions through renewable energy. An additional option is to capture the emissions and store them. This process is called carbon capture and storage, and it can be part of the solution to achieve the deep GHG reductions required. It is an important consideration for Nova Scotia's coal-dependent energy infrastructure.

The first step in this process is to subject coal to oxygen and steam under pressure in order to extract a gas out of the coal. Any air pollutants and carbon dioxide are captured, and the carbon dioxide is stored in porous underground geological structures such as deep saline aquifers.

In order to responsibly utilize this technology, proper research must be conducted regarding Nova Scotia's potential to safely store carbon dioxide within its geology. A full lifecycle accounting of the extra emissions that result from the energy it takes to capture and store carbon is also necessary. It is important to recognize that existing indus-

tries, such as Nova Scotia Power, are likely to find it within their corporate interest to capture and store carbon from their existing power plants in order to stay with the technologies and fuel types in which they have investments and expertise.

Recent results from an electricity-system Integrated Resource Plan shows that Nova Scotia Power Inc. would rely, to a significant degree, on carbon capture and storage technology to achieve reductions 30% and 50% below 1990 levels by 2020. These results show that carbon capture and storage technology is a preferred option for the company. It also shows that investments in the development of this technology will occur if governments institute GHG regulations based on science-based reduction targets.

It is crucially important that Nova Scotia not allow the development of carbon capture and storage to hinder the development of more radical technologies such as wind, solar, and tidal power. Creating niche-markets and innovation strategies to allow these technologies to develop to their full potential is extremely important, all the more so because capturing and storing carbon is no substitute for eliminating its production in the first place.

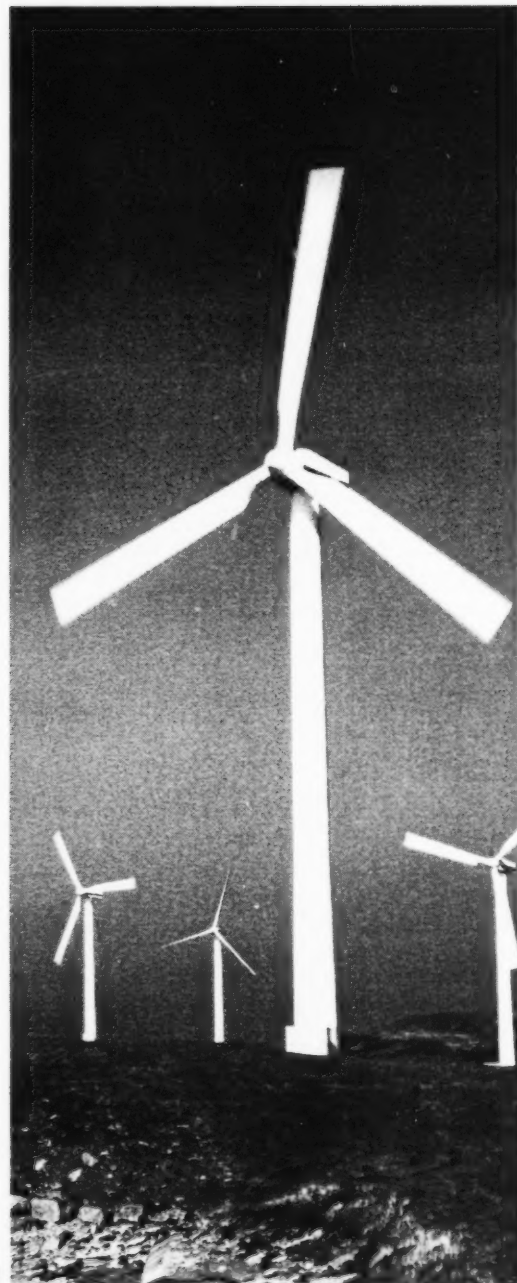
Transitions in Existing Industries

Innovation is about transformation and transition. It is about shifting production from old products and processes to new ones. The pathway to sustainable prosperity through innovation moves us towards a more community-focused, less waste-

ful, higher value-added, democratic and socially responsible economy.

As already mentioned, some existing industries can feel threatened by newer, greener technologies. But, continuing the subsidization of pollution or offering short-term subsidies and pay-offs to existing industries that feel threatened by sustainable prosperity works to the detriment of Nova Scotia's long-term economic development and the development of existing industries themselves. Michael Porter, an internationally renowned expert on competition and corporate strategy from Harvard University explains that, "policies that convey static, short-term cost advantages but that unconsciously undermine innovation and dynamism represent the most common and profound error in government industrial policy."⁴⁴

To meet Nova Scotia's environmental and economic goals the province will require specific knowledge of the processes, products and operations in existing industries to implement targeted and forward-looking regional, sector and business-specific strategies. Nova Scotia needs to identify the industries that will drive development towards sustainable prosperity in the future. We need to work with existing industries to reduce their waste, upgrade their processes, and shift production into new areas. The province will also need to identify the "sunset" industries that will not contribute to Nova Scotia's economic development in the future. In these circumstances, active labour market policies are required to transition from old jobs to new, by providing direct social support, job transfer



assistance, and skills upgrades in collaboration with workers and their unions.⁴⁵

Ensuring that our unions, local communities, and existing industries enthusiastically support, and indeed drive, the transition towards less wasteful and more innovative forms of work is a path towards sustainable prosperity that we cannot neglect.

Conclusion

Nova Scotia has an urgent and important opportunity to focus the resources of its universities, businesses, unions and organizations towards developing cutting-edge sustainable energy technologies and institutions. To do this well will require the fostering of processes that create knowledge. We must also ensure that old industries do not hamper potential innovations. Nova Scotia could be known as a place that supports entrepreneurs in sustainable energy through university-community linkages and as a province that delivers high returns for businesses and workers in clean energy developments. This will help the province demonstrate international leadership in sustainability.

Pathway to Sustainable Prosperity Through Innovation

To Demonstrate International Leadership

- Harness the potential of our universities, in partnership with businesses, communities, unions, and governments, to develop emerging sustainable energy technologies.
- Launch a collaborative process to maximize knowledge and innovation in all aspects of ocean energy.
- Develop sustainable energy clusters in emerging industries such as solar.
- Trigger research into carbon capture and storage technologies by creating a target to reduce GHGs by at least 30% below 1990 levels by 2020.
- Undertake a comprehensive geographic inventory of existing industrial sectors and their processes to implement specific regional and sectoral strategies for sustainable prosperity.
- Garner support for sustainable energy innovation by implementing active labour market policies to transition from old jobs to new, by providing direct social supports, job transfer assistance, and skills upgrades in collaboration with workers and their unions.

Conclusions: The First Steps On the Path to a Sustainable Energy Future

Nova Scotia is embarking on a journey down a new path. To be sure, Nova Scotia's fossil fuel based energy system makes the province a major contributor to global warming. This fossil-fuel dependence leaves Nova Scotia vulnerable to being left behind in a carbon-constrained economy where polluters will be penalized and clean industries rewarded. But if we have the courage to begin the journey, the path towards a low-carbon future will reveal an array of exciting, new opportunities.

Nova Scotia has the potential to develop sustainable energy systems that will achieve deep greenhouse gas reductions. By mid-century, Nova Scotia can be known as a province that leap-frogged towards a low-carbon future for the benefit of the planet as well as its own economic and social well-being. If we don't start down a sustainable energy path, we will be remembered as a province that turned its back on the rest of the world, and on economic investment, by continuing to pollute.

The policy choices we have outlined require investments and changes from business as usual. They also highlight important economic development opportunities for Atlantic Canadians. Nova Scotians know far too well the boom and bust cycles brought forward by large, fossil fuel based, energy projects. We have far too much experience with declining manufacturing employment and out-migration as young people leave their homes to work in polluting industries elsewhere.

It is time for Nova Scotia to harness the potential for sustainable, appropriate development that aims to bring full benefits to local communities.

Nova Scotia can reverse the outflow of people and capital from the region. We can save money and create jobs in our communities by maximizing our investments in energy efficiency. Our local communities can make money by selling energy from renewable and combined heat and power projects. We can create knowledge and wealth by focusing our efforts on innovation in key sustainable energy sectors in partnership with our universities. Most important of all, we can do our part in meeting the challenge of the climate crisis that threatens us all.

Nova Scotia's Environmental Goals and Sustainable Prosperity Act has identified a vision and a desired future that sees our province demonstrating international leadership in sustainable development. This paper has identified some of the strategic opportunities Nova Scotia must grasp if it is to meet its short and long-term goals. How resolutely and effectively we embark on the path towards sustainable energy prosperity is up to Nova Scotians and their leaders. Let's see Nova Scotia steadfastly progress down new and exciting pathways towards a cleaner environment, economic self-sufficiency, and international recognition.

By mid-century, Nova Scotia can be known as a province that leap-frogged towards a low-carbon future for the benefit of the planet as well as its own economic and social well-being.

Pathways to Sustainable Energy Prosperity



Pathway to Sustainable Prosperity Through Greenhouse Gas Reductions

To Meet Environmental Goals

- Introduce absolute, outcome-oriented regulations on large industries to reduce their emissions by 10% or more below 1990 levels by 2020 through domestic reductions.
- Establish short-term GHG reduction targets with meaningful action for all sectors of the economy.

To Demonstrate International Leadership

- Lead the negotiation of a strong inter-provincial or federal greenhouse gas accord to create market-based regulations that reward further emission reductions in Nova Scotia.
- Induce greater innovation by re-evaluating the adequacy of the 10% greenhouse gas reduction goal to align Nova Scotia with internationally respected, science-based targets for industrialized regions.

Pathway to Sustainable Prosperity Through Energy Efficiency

To Meet Environmental Goals

- Commit, in legislation, to making all energy efficiency improvements that are cost-effectively achievable, for all fuel types.
- Develop a clear business plan to maximize energy efficiency in all sectors and for all fuel types.
- Ensure accountability for achieving efficiency improvements:
- Establish energy efficiency charges on utility bills and a legislative guarantee against funding raids;
- Establish specific, aggressive and realistic targets related to energy savings, market transformations, and equal service provision;
- Establish a properly-resourced stakeholder management board that will help develop efficiency business plans;
- Sign performance-based contracts with efficiency delivery agent(s) with incentives and disincentives associated with meeting targets;

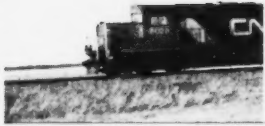
To Demonstrate International Leadership

- Work regionally to make Atlantic Canada's economy the most energy efficient in the world through sharing of best practices and industrial innovations.

Pathway to Sustainable Prosperity Through Combined Heat and Power

To Meet Environmental Goals

- Recycle energy through combined heat and power.
- Provide businesses and communities with access to the grid at prices that encourage combined heat and power.
- Create regulations and incentives to encourage the utilization of waste heat from thermal electricity plants.



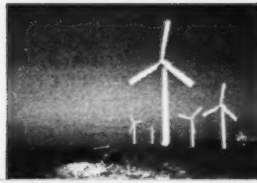
Pathway to Sustainable Prosperity Through Sustainable Transportation

To Meet Environmental Goals

- Legislate California Vehicle Emission Standards.
- Increase provincial per-capita investments in transit and active transportation capital and operating expenditures to the Canadian average.
- Implement aggressive campaigns and policies to make, grow and buy local.

To Demonstrate International Leadership

- Utilize smart design principles to develop energy efficient, safe, healthy, and vibrant communities.
- Champion the development of national and regional sustainable rail transportation networks.



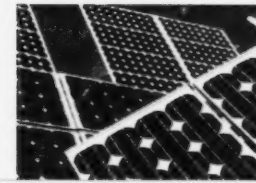
Pathway to Sustainable Prosperity Through Renewable Energy

To Meet Environmental Goals

- Re-evaluate the current, single-minded, renewable energy procurement policy in light of new environmental and economic development goals.
- Develop policies that create opportunities for municipal and community ownership of renewable energy developments.
- Open renewable energy markets up to rural communities and emerging technologies by implementing an electricity feed-in tariff.

To Demonstrate International Leadership

- Expand the amount of renewable power through regional cooperation.

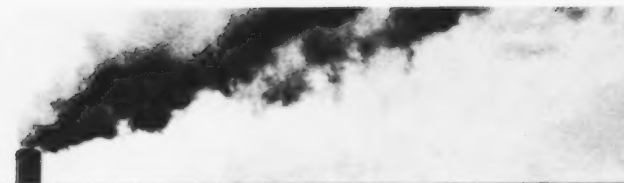


Pathway to Sustainable Prosperity Through Innovation

To Demonstrate International Leadership

- Harness the potential of our universities, in partnership with businesses, communities, unions, and governments, to develop emerging sustainable energy technologies.
- Launch a collaborative process to maximize knowledge and innovation in all aspects of ocean energy.
- Develop sustainable energy clusters in emerging industries such as solar.
- Trigger research into carbon capture and storage technologies by creating a target to reduce GHGs by at least 30% below 1990 levels by 2020.
- Undertake a comprehensive geographic inventory of existing industrial sectors and their processes to implement specific regional and sectoral strategies for sustainable prosperity.
- Garner support for sustainable energy innovation by implementing active labour market policies to transition from old jobs to new, by providing direct social supports, job transfer assistance, and skills upgrades in collaboration with workers and their unions.

Endnotes



¹ See Matthew Bramley 2005 "The Case for Deep Reductions: Canada's Role in Preventing Dangerous Climate Change" *David Suzuki Foundation & Pembina Institute*.

² See Matthew Bramley 2007 "Analysis of the Government of Canada's April 2007 Greenhouse Gas Policy Announcement", *The Pembina Institute*, May 28th

³ Nicholas Stern 2007 *The Economics of Climate Change* Cambridge University Press

⁴ \$1.6 to \$6.3 billion is 5% and 20%, respectively, of Nova Scotia's current Gross Domestic Product.

⁵ "Adapting to a Changing Climate in Nova Scotia: Vulnerability Assessment and Adaptation Options", June 2005, available at <http://www.gov.ns.ca/energy>

⁶ See Matthew Bramley 2005 "The Case for Deep Reductions: Canada's Role in Preventing Dangerous Climate Change" *David Suzuki Foundation & The Pembina Institute*.

⁷ Bill 146, *Environmental Goals and Sustainable Prosperity Act*, 1st Sess., 60th., Leg., Nova Scotia, 2007 (assented to 13 April 2007, c. 7).

⁸ The EU has agreed to a 30% below 1990 levels by 2020 if other industrialized countries (such as Canada) also agree to this target.

⁹ Marc Jaccard 2003 *The Cost of Climate Policy* UBC Press.

¹⁰ See Matthew Bramley 2007 "Analysis of the Government of Canada's April 2007 Greenhouse Gas Policy Announcement", *The Pembina Institute*, May 28th

¹¹ Environment Canada 2006 "National Inventory Report: Greenhouse Gas Sources and Sinks in Canada 1990-2004" April & Facility GHG Reporting.

¹² See David Crane "Ottawa appears to be missing the boat on climate change" *Halifax Herald*, June 7th, 2007.

¹³ See Michael E. Porter & Claas Van Der Linde "Green and Competitive: Ending the Stalemate" in 1996 *On Competition* Boston: Harvard Business Review.

¹⁴ New England Governors and Eastern Canadian Premiers 2001 Climate Action Plan.

¹⁵ Working Group III contribution to the Intergovernmental Panel on Climate Change Fourth Assessment Report Climate Change 2007: Mitigation of Climate Change Summary for Policymakers, pg. 29.

¹⁶ *Environmental Goals and Sustainable Prosperity Act* Sec 3(1)(g).

¹⁷ *Environmental Goals and Sustainable Prosperity Act* Sections 5(b) & (f) & 7(1)(c), 9(1)(b)(d).

¹⁸ The following figures are taken from spreadsheets provided as part of the assumptions for an Integrated Resource Planning process currently being undertaken by Nova Scotia Power Inc. and the Utility and Review Board. The numbers referenced are from a case where 5% of utility revenues are spent on efficiency. The EAC has made its own calculations to provide the number for the net lifetime energy savings estimate by utilizing NSPI's stated levelized avoided costs of 9.9 cents per kilo-watt hour and stated program costs.

¹⁹ Statement of NSPI levelized avoided cost in letter to Ecology Action Centre from Summit Blue Consulting dated October 18th, 2006 and received February 19th, 2007. A levelized cost converts the overall cost to equal annual payments in real dollars (adjusted for inflation).

²⁰ Conventional energy projects are estimated to create 7 jobs per \$1 million invested. Campbell et al. 1997 "Comparative Analysis of Employment From Air Emission Reduction Measures" Report by *The Pembina Institute* for Environment Canada - Global Air Issues Branch.

²¹ See Larry Hughes 2005 "Natural Gas vs. District Heating" available at <http://delh.electricalandcomputerengineering.dal.ca/enen/index.html>

²² *David Suzuki Foundation* 2006 "California vehicle emission standard a perfect fit for Canada".

²³ GPI Atlantic 2000. *Cost of Obesity in Nova Scotia*. Prepared for Cancer Care Nova Scotia.

²⁴ *Ibid*

²⁵ NS Health Promotion and Protection and NS Department of Education 2007 "Physical Activity Levels and Dietary Intake of Children and Youth in the Province of Nova Scotia 2005".

²⁶ Velo Quebec 2006 "La Route Verte: Bicycling in Quebec 2005: A Population on the Move".

²⁷ Go for Green 2004 "The Business Case for Active Transportation: The Economic Benefits of Walking and Cycling".

²⁸ GPI Atlantic 2006 "The GPI Transportation Accounts: Sustainable Transportation in Nova Scotia".

²⁹ George Monbiot 2006 *Heat: How to Stop the Planet from Burning* Doubleday Canada, pg. 147.

³⁰ Ontario Ministry of Transportation. *Pavement Design and Rehabilitation Manual* (SDO-90-01).

³¹ M. Xuereb 2005. "Food Miles: Environmental Implications of Food Imports to the Waterloo Region." *Region of Waterloo Public Health*. [Electronic Version] Retrieved March 15, 2007 from [http://chd.region.waterloo.on.ca/web/health.nsf/0/F9E487C67FAC45E885256FE90060ADF6/\\$file/Food_Miles_Report.pdf?openelement](http://chd.region.waterloo.on.ca/web/health.nsf/0/F9E487C67FAC45E885256FE90060ADF6/$file/Food_Miles_Report.pdf?openelement).

³² Comparable Nova Scotia data has not yet been compiled, though the Ecology Action Centre is conducting a Nova Scotia Food Miles study.

³³ *Environmental Goals and Sustainable Prosperity Act* Sec 4(2)(g)

³⁴ NSPI Integrated Resource Plan Modeling Results, May 11th, 2007, Deliverable to Stakeholders.

³⁵ See the NS Co-op Council Renewable Energy Initiative at <http://www.nscocouncil.ca/energy/>

³⁶ Building a "Margin of Safety" into Renewable Energy Procurements: A Review of Experience with Contract Failure. Consultant Report prepared by KEMA Inc. for California Energy Commission, January 2006.

³⁷ The BC Energy Plan: A Vision for Clean Energy Leadership, available at <http://www.energyplan.gov.bc.ca/>

³⁸ Bernard Chabot, economist with France's Agency for Environment and Energy Management quoted in Paul Gipe 2004 "Wind Power for Farm, Homes & Business" *Chelsea Green*, pg. 212.

³⁹ Premier's Advisory Council on Innovation: Interim Report of Council.

⁴⁰ Chris Freeman & Luc Soete 1997 *The Economics of Industrial Innovation* Cambridge: MIT Press, pg. 421.

⁴¹ *Ibid*

⁴² *Ibid*

⁴³ Rick Conrod "Private sector lagging in R&D" *Halifax Herald*, Nov 30th, 2005.

⁴⁴ Michael E. Porter "The Competitive Advantage of Nations" in 1996 *On Competition* Boston: Harvard Business Review, pg. 186.

⁴⁵ This policy is often titled a "Just Transitions". Canada's Communications, Energy and Paperworkers Union and the Canadian Labour Congress have enthusiastically promoted a "Just Transitions" policy.

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